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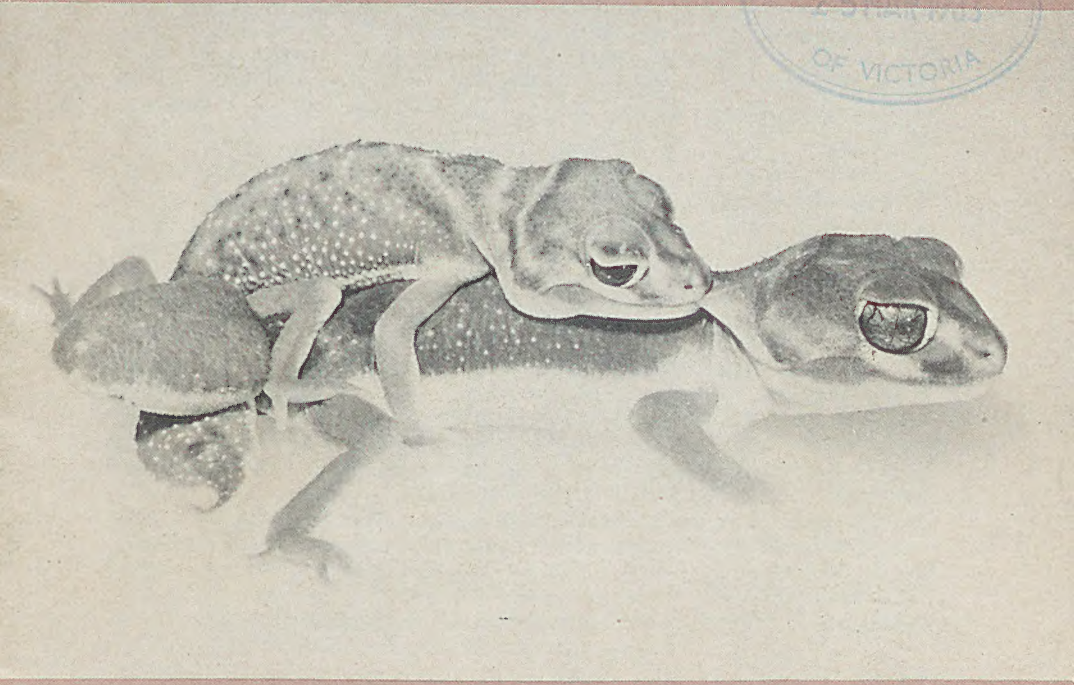

The KNOB-TAILED GECKO *Nephrurus levis* De Vis.

A mating pair of *Nephrurus levis* from Maud Hill, Western Australia. This is a terrestrial gecko found in the arid parts of all mainland states, and one of a genus which is characterised by a large head and a short tail ending in a knob.

Photo by Dr. A. E. Greer.

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THE REPTILES OF LIZARD ISLAND

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"The only land animals we saw here were lizards, and these seemed to be pretty plenty, which occassioned my naming the island Lizard Island" wrote Lieut. James Cook, 12 August 1779 (Wharton, 1893). For the historically-minded herpetologist, Lizard Island is an obviously important locality.

Sir Joseph Banks accompanied Cook ashore on Lizard Island and wrote ". . . . the island itself is small and barren; on it was, however, one small tract of woodland which abounded very much with large lizards some of which I took . . ." (Beaglehole, 1962) to which Beaglehole added this editorial note: "No specimens of these lizards have been traced nor has any description been found. No subsequent visitor to the island appears to have mentioned them . . . It has been suggested that the island may have been inhabited by the monitor *Varanus semirex* Kinghorn at present restricted to Coquet Island".

MacGillivray (1852) visited Lizard Island in 1846 and wrote "of quail which in 1844 were very abundant, I saw not more than one or two . . . . . snakes appear to be numerous — two out of the three which I examined were poisonous — the other was the diamond snake of New South Wales". Banks in 1770 (Beaglehole, ibid) and MacGillivray in 1846 (ibid) recorded plentiful remains from turtle feasts on nearby Eagle Cay but did not record similar remains on Lizard Island. Johnston exhibited a collection of 4 species of small lizards (about 35 specimens of 3 skinks and 1 gecko) to the Linnean Society of New South Wales (Anon., 1901). Smith (1974) reported 10 species of reptiles including an abundant goanna species and three species of non-venomous snakes (unidentified). Covacevich and Ingram (1975) described *Carlia dogare* with some of the paratypes collected from Lizard Island.

In 1974 an era began for the island with two intensive building programs for the development of a large tourist resort and the Australian Museum Research Station. This present study provides a survey of Lizard Island's reptilian fauna at that time.

Locality:

Lizard Island (14°40′ S, 145°28′ E) is a continental island with an area of approximately 1,000 ha, 29 km off-shore from mainland Queensland and 22 km inside the outer edge of the Great Barrier Reef. The island is a granite outcrop rising to 359.4 m (Craig, 1973). The majority of the island consists of rock-strewn hillsides covered by grasses, shrubs and low brush. On the low lying areas grasslands, *Pandanus* and *Melaleuca* dominated swamps occur. Low open forest and deciduous low closed forest cover much of the south-western corner of the island. The strand varies from grass and shrub-covered sand dunes, to mangroves and bare rock faces. Exfoliated granitic slabs are strewn over much of the exposed less steeply sloping rock surfaces. A permanent stream on the eastern slopes is lined by closed forest.

Methods:

The island was visited between 30 August and 13 September 1974 and again on 23 and 24 February 1975. Systematic hand collecting of terrestrial reptiles by day and by night was carried out in representative areas of all major habitat types recognised. Representative specimens of all species have been lodged in the Queensland National Parks and Wildlife Service reference collection at Pallarenda, Townsville. A search was made of the reptile collections in the Queensland Museum, Brisbane, and Australian Museum, Sydney, for species from Lizard Island not recorded in the field by the author.

Approximately 20 hours were spent diving and snorkling over a wide variety of the reef habitat types during the September 1974 visit to locate aquatic reptiles. Some turtles were identified from photographs taken by Mr. P. Faulkes of Lizard Island.

Terrestrial reptiles:

Sixteen species of terrestrial reptiles were identified from Lizard Island (2 Gekkonidae, 1 Pygopodidae, 7 Scincidae, 1 Varanidae, 1 Typhlopidae, 1 Boidae, 2 Colubridae, 1 Elapidae). These are listed in Table 1 with relative frequency of sighting by habitat types shown on a three-point scale. Only one species, the snake *Stegonotus cucullatus* (Duméril, Bibron and Duméril), was represented in the collections of the Australian Museum and the Queensland Museum and not collected by the author at Lizard Island.

Eight of the 11 lizard species were so abundant as to be seen daily (or nightly) in particular habitats. Each occupied a different niche. Four of these were small arthropod-eating diurnal lizards: *Cryptoblepharus virgatus* (Garman) was arboreal in the dune areas behind the beaches while *C. litoralis* (Mertens) inhabited the supralittoral rocks (although on nearby Bird Islet where no *C. virgatus* was recorded *C. litoralis* was also arboreal in the strand shrubs). *Carlia dogare* Covacevich and Ingram, a surface-forager, was most abundant in grassland and grassy low open forests while the slightly larger *C. fusca* (Duméril and Bibron) was most frequently found foraging over the litter of the denser low closed forest. *Varanus gouldii* (Gray), a large diurnal predator, was found commonly in most habitats; indeed few areas of the island were not marked by its diggings. The crepuscular fossorial insectivorous skink *Sphenomorphus nigricaudus* (Macleay) was usually found in thick litter areas where it was active from mid-afternoon onwards. Additionally it was briefly active in the mornings basking in sun patches on the forest floor. The geckos were nocturnal insectivores. *Gehyra australis* Gray was commonly found on trees and granite surfaces while *Cyrtodactylus pelagicus* (Girard) was a ground surface-foraging species; both were wide spread through out the island. In the high exposed granite ridges these last two were present in low densities, often under adjacent granite exfoliations by day. *G. australis* was most dense among the *Casuarina equisitifolia* of the dunes, usually foraging in the lower 2 m of the trunks and main branches by night. *C. pelagicus* had the greatest density in the areas of thick litter, grass or ground cover.

Of the remaining lizard species, *S. pardalis* (Macleay) was similar to *S. nigricaudis* in shape, size and activity but was found in the more open forest and grassland habitat. *S. crassicaudus* (Duméril) has even greater reduction of limbs than the other two *Sphenomorphus* and may therefore burrow more extensively than these. *S. crassicaudus* and *Delma tincta* De Vis were each represented by single specimen records.

Few recordings were made of snakes. The island's residents indicated that snakes were seen infrequently at any time. Three snake species (*Liasis childreni* Gray, *Dendrelaphis calligaster* (Gunther) and *Glyphodon tristis* (Gunther) were recorded more than once. These same species were identified by local residents as the most frequently seen snakes on the island, accounting for almost all previous snake sightings. The major vertebrate food available to the snakes and the varanid would appear to be the lizards and frogs. An intensive search of the island during the September 1974 visit failed to reveal any evidence of small ground mammals, and small birds were found to be scarce throughout most of the island. Of the few snakes collected only one *G. tristis* contained any stomach contents (*Carlia sp.* remains). One *Liasis childreni* was seen being taken by a white-breasted sea-eagle *(Haliaeetus leucogaster* (Gmelin) from a rock surface in the early afternoon.

Lepidodactylus lugubris (Duméril and Bibron) was not found despite a specific search. This is a wide-spread gecko found on the islands and the coastal mainland of north Queensland; neither this gecko nor its characteristically adhesive eggs could be found on Lizard Island. No dragon (Agamidae) was found although they are frequently seen in similar habitat types on the adjacent mainland.

Marine Reptiles

Turtle nests sites were mostly found on the exposed south eastern beach. In February 1975 there were 24 body pits identified along the dune from the 1974-1975 season's nesting. The few old body pits found in September 1974 on this beach were consistent with a similar low density of turtle nesting in the previous season. Hatchling remains in 4 nests sampled were all of *Chelonia mydas* (L). *Caretta caretta* (L) was identified from a photograph of an unsuccessful nesting on the resort (western) beach late in December 1973.

On the fringing coral reefs surrounding Lizard Island in September 1974, 20 juvenile *C. mydas* (approximately 40-65 cm carapace length) and 2 adult male *C. caretta* sightings were recorded. *Eretmochelys imbricata* (L.) were identified from photographs as also occurring on this reef. No turtle remains were found during surface examinations of the old aboriginal middens; the few vertebrate remains were from dugong.

Local residents reported that sea snakes occasionally were seen over the adjacent reefs although the author saw none while diving.

Comments:

Keys for identification of the reptiles found on Lizard Island and general species descriptions are readily available (Cogger, 1979).

A number of species of reptiles previously recorded from Lizard Island were not recorded during this study. *Gehyra variegata* (Duméril and Bibron), *Lygosoma (= Sphenmorphus) pardalis* MacLeay, *Lygosoma (=Carlia) pectorale* De Vis, and *Lygosoma (= Carlia)* D. & B. were recorded among a collection of about 35 specimens exhibited to the Linnean Society of New South Wales (Anon., 1901). The present author was unable to find any further record of this collection. Three of these four species *Gehyra variegata, Carlia pectorale* and *Carlia peroni* were not found in the present study. Cogger (1979) records *Gehyra variegata* from mainland Queensland opposite Lizard Isalnd; *C. peroni* is known only from Indonesia (Greer, 1976) and *C. pectoralis* is not known from adjacent areas including the mainland. For these reasons and because of past taxonomic problems associated with the genus *Carlia*, it is suggested that Johnston's identifications of *C. peroni* and *C. pectoralis* were in fact misidentifications of either *C. dogare, C. fusca* or both and are omitted from the list given in Table 1. Beaglehole (1962) suggested that the large lizard recorded by Cook and Banks in 1770 may have been "*Varanus semirex* Kinghorn at present restricted to Coquet Island". Presumably he was referring to the arboreal *V. semiremex* Peters, but no specimen of this has been recorded from Lizard Island and no evidence of an arboreal varanid was found during this survey. MacGillivray (1852) recorded the diamond snake of New South Wales from Lizard Island. This common name has normally been applied to *Python spilotes spilotes* (Lacepede) which has not been recorded from North Queensland. MacGillivray may have been confusing the then recently described *Liasis childreni* with the diamond snake or referring to a specimen of the carpet snake, *Python spilotes variegata* (Gray); the latter does occur on the adjacent mainland. The occurrence of *P. spilotes* on Lizard Island needs confirmation. Thus these four lizard species and one snake species previously recorded for Lizard Island but not represented in any known collections from the island are omitted from its list of reptilian fauna.

The two species often found in association with human habitation and found on Lizard Island buildings, *Gehyra australis* and *Cryptoblepharus virgatus*, were

TABLE 1.

Terrestrial reptiles identified in recent years from Lizard Island. The relative frequency sightings by habitats is shown as:

*** recorded each day/night the habitat was examined.

** not recorded each day/night but sighted on several occasions in that habitat.

* Single specimens only recorded.

	Supralittoral rocks	Dune complex	Exposed granite outcrops	Closed grassland Grassy open heath	Grassy low open forest	Low open forest (moist)	Low closed forest	Closed forest	Buildings
GEKKONIDAE									
Crytodactylus pelagicus		**	**	***	**		***		
Gehyra australis		***	**						***
PYGOPODIDAE									
Delma tincta				*					
SCINCIDAE									
Carlia dogare		***		***	***		*		
Carlia fusca		*			*		***	***	
Cryptoblepharus virgatus		**							***
Cryptoblepharus litoralis	***	*							
Sphenomorphus crassicaudus							*		
Sphenomorphus nigricaudus							***	**	
Sphenomorphus pardalis				**	**				
VARANIDAE									
Varanus gouldii		***		***	***	**	***		
TYPHLOPIDAE									
Rhamphotyphlops polygrammica (Schlegel)				*					
BOIDAE									
Liasis childreni			*	**					
COLUBRIDAE									
Dendrelaphis calligaster					**				
Stegonotus cucullatus	Field Data Not Available								
ELAPIDAE									
Glyphodon tristis					**				

widely distributed on the island. Both species were well established before the building programs on the island began.

At the time of this study there were sixteen species of terrestrial reptiles on this 1,000 ha rocky island. This falls within the range of the species number-to-area ratio obtained from similar sized rocky islands in Papua New Guinea (Heatwole, 1975). Sea turtles nest only sporadically on Lizard Island during the summer months, the more common nesting species being *Chelonia mydas.* Lizard Island is the most northern locality in Australia from which *Caretta caretta* nesting has been reported. This latter species nests principally on subtropical beaches.

Lizard Island would have separated from the mainland most recently during the last Holocene transgression when rising post-glacial sea levels submerged the present day continental shelf 10,000 yr. B.P. (Galloway and Kemp, 1981). No endemic reptile taxon is recognised for Lizard Island. The lack of detailed information on the herpetofauna of the adjacent mainland does not allow for a detailed investigation of differences in the herpetofaunas of Lizard Island and the mainland. However all of the species from Lizard Island (Table 1) are expected to occur on the immediately adjacent mainland and all except the littoral skink *C. litoralis*

could have been present on Lizard Island prior to the time of its separation from the mainland. *C. litoralis*, a common inhabitant of coral cays of the northern Great Barrier Reef Provence, could have rafted to Lizard Island after separation. Of note are the groups of reptiles absent from the Island in 1974. These included the agamids, large skinks and large elapid snakes.

Low (1978) described the reptile fauna of Magnetic Island (19°10'S, a similar granitic continental island, about 5 km offshore from Townsville). When compared to similar habitats on the immediately adjacent mainland, Magnetic Island has a depleted reptile fauna, with agamids, large skinks and large snakes being prominent by their absence. The reason for these absences from these two large continental islands is not clear at present. A study of the herpetofauna of Great Barrier Reef coral cays which have been formed since the establishment of current sea levels may provide some understanding of the ability of our reptiles to cross water barriers and of the role of continued recruitment from the mainland in maintaining existing isolated island populations of reptiles.

The only large lizard presently represented in the island's fauna is *Varanus gouldii*. This is almost certainly the species which impressed Cook and Banks in 1770. Between Cook's visit and present times there is no record of such a large lizard for Lizard Island yet the *Varanus gouldii* was abundant throughout the island during the author's visits and apparently when Cook and Banks visited the island 204 years earlier.

MacGillivray (1852) is the only author to suggest that snakes were abundant at any time. It is possible that population densities of some terrestrial reptiles on Lizard Island have fluctuated widely in the past two centuries.

Acknowledgements:

The Australian Museum Research Station provided accommodation during the 1974 visit. Mr. P Faulkes assisted in diving and boating work. Dr. H. Cogger (Australian Museum) and Ms. J. Covacevich (Queensland Museum) assisted in species identification, gave access to their respective collections and, with Mr. C. Ingram and Dr. A. Greer, made useful recommendations during the preparation of the manuscript.

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INITIAL OBSERVATIONS ON THE CAPTIVE REPRODUCTION OF *VARANUS STORRI*, MERTENS.

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The reproductive patterns of the various varanid lizards are poorly understood in the United States. Although numbers are maintained both in zoological private collections, the few records of captive breedings (5 species) seem as much by accident as by intent. The great size at maturity of many species as well as the attendant difficulty in sexing varanid lizards in general makes this lack of knowledge understandable if not acceptable.

In 1979 I moved from New England to southwestern Florida, bringing with me a number of long term captive reptiles including small colonies of three varanid lizards, *Varanus acanthurus, V. storri,* and *V. timorensis.* A comparison of average temperatures disclosed that our normal winter mean was only slightly cooler than and summer averages were virtually identical with those of the lizard's natural ranges. In spite of a noticeably higher average relative humidity it was decided to house the three species permanently out of doors. The enclosures were simply constructed, being merely a ring of 95 cm. high sheet aluminum, 2½ m in diameter, sunk into the ground to a depth of 35 cm.

Refugia were created by sinking several cinder building blocks into the ground at various locations with the holes of the block running horizontally. On top of these were piled several large chunks of natural coral rock, the intent of which was to offer further security in addition to prominent basking areas. Succulent vegetation was planted and natural grasses were allowed to remain.

Into one such pen were introduced eight *Varanus storri,* all of which were long term captives. They spent several days investigating their new facilities thoroughly, but soon the three males established home territories, each claiming a separate pile of coral boulders and refugium as its own. During the first summer two females succumbed to predation by outside sources, one falling prey to a marsh harrier, *Circus cyanea,* and the second to an unknown predator, probably a feral cat. The remaining six lizards became even more alert, and now I believe they are as observant and evasive as wild specimens. Unless extreme stealth is used when approaching the pen seldom is a *storri* seen.

Now well into the second year in these enclosures all specimens appear in excellent health, having survived a year of temperature extremes. An arctic low brought unparalleled low temperatures for a period of several days this past winter. Upon several occasions the thermometer plummeted to −6°C. Precisely opposite to these extremes were those of June 1981 when temperatures of from 37°C to 41°C were recorded for seven consecutive days. During the cold weather the lizards emerge from their refugia only after the basking situations have been well warmed by the sun. On cloudy days they are not seen at all. Conversely, during periods of extreme heat they bask early and late, retiring to their refugia during midday.

Their food consists of gray crickets dusted with a vitamin powder, canned cat food (which they accept only reluctantly) and newly born mice. Occasionally native insects or brown anoles, *Anolis sagrei,* enter the pen and become a part of

goannas menu. Fresh water is always available.

Breeding activity was apparent shortly after the lizards were housed in their outside enclosure. While no actual courtship was observed the territorial skirmishes of the males became more pronounced. Seldom does one male encroach upon the rock pile of another without encountering the owner ready to do battle. The most frequent method of attack is a grip by the jaws of the resident male upon the nape of the neck of the intruder. With but one exception, which resulted in the loss of the distal ¼ of a tail, the altercations have not resulted in injury. At no time have I observed the movements of the females being challenged. They move freely about the pen showing no recognition of territories.

In mid-summer of 1980 it was noticed that the *storri* had dug numerous tunnels of their own to augment the man-created refugia. These were at a depth of approximately 15 cm beneath the surface of the ground. While some were quite extensive, others extended laterally for a distance of approximately 30 cm, terminating in a cul-de-sac.

On the morning of 10th February 1981, due to the exceedingly low night-time temperatures (−4°C) I decided to check the *storri* to ascertain that all were either in the lowermost refugia (hibernacula) or the burrows of their own making, thus placing them well away from the coldest temperatures. As I moved some surface rocks two obviously fresh though badly desiccated eggs were noticed at the mouth of one of the cul-de-sac burrows. Since this particular burrow was constructed close to the surface of the ground I elected to open it for inspection. In so doing I found a third egg, this one in excellent condition, at the end of the burrow beneath a torpid female *storri.*

The egg was removed to indoor incubation in a container of barely moistened sphagnum moss, where at temperatures that varied from 28.5 to 30°C it hatched 80 days later.

The hatchling was identical in coloration and pattern to the adults. Its measurements were:
overall length, 133 mm. snout-vent length 57 mm, head length, 14.5 mm, head width, 9.5 mm.

Within a few hours of hatching it had accepted adult gray crickets and has shown rapid growth. At the time of writing (23 July 1981) it is half the size of the adults.

INSULAR RANGE EXTENSIONS FOR THE NEW GUINEA BLUETONGUE, *TILIQUA GIGAS* (BODDAERT) (LACERTILIA: SCINCIDAE)

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Introduction:
Tiliqua gigas is the least known of the large bluetongue skinks. The most recent detailed description of the species is that of de Rooij (1915). Oudemans (1894) described a subspecies, *Tiliqua gigas keyensis* from two specimens from the Kei Islands. Tanner (1950) and Burt and Burt (1932) provide descriptions of one and two specimens respectively. Cogger (1972) provides a photograph of living specimens.

Cogger (1979) gives the range of the species as from New Guinea west to Sumatra. However, the presence of *Tiliqua gigas* on islands off the New Guinea coast is poorly documented. Recent examination of the *Tiliqua* collections of the Australian Museum, Sydney, by the author has revealed three apparently previously unpublished records of *Tiliqua gigas* from islands and island groups off the north and east coasts of New Guinea.

New Records

a). *Trobriand Islands:* AM R10470 is registered as coming from the Trobriand Islands (8°S 151°E) and is part of a collection of reptiles from the Trobriands presented by J. Vogan and registered in September 1931. No date of collection is available for any of the specimens in this collection.

It is not recorded from which of the Trobriand islands the *Tiliqua* came. Heatwole (1975) does not record *T. gigas* in collections he made in the Trobriand Islands and it is possible that AM R10470 was collected nearby D'Entrecasteaux Islands, *T. gigas* having been reported from two islands in that group, Fergusson (9°30' S, 150°42' E) by Boulenger (1895) and Goodenough (9°31' S 150°20' E) by Burt and Burt (1932). *T. gigas* has been recorded from the adjacent New Guinea coast at Milne Bay by Boulenger (1897).

b). *Admiralty Islands:* Hediger (1933) and Tanner (1951) do not record *T. gigas* from the Admiralties. However, three specimens of *T. gigas* in the Australian Museum with different collection data indicate that *T. gigas* is present in this group. AM R19307, from Pisik, on Lou Island (2°24' S, 147°20' E) was collected by K.F. Silva, and registered in 1963. Silva's collection from Pisik includes 4 snakes (4 spp.) and 47 lizards (11 spp.) No date of collection is available for the *Tiliqua,* but all other specimens for which dates exist were collected in February 1963, suggesting a similar date of collection for AM R19307. Two specimens of *T. gigas* (AM R97572—73) were collected by N.C. Goddard on Los Negros Island (2°01' S, 147°26' E) on 14 May 1952 and 25 April 1952 respectively.

The lack of records of *T. gigas* from Manus Island, adjacent to Los Negros Island, and by far the largest of the Admiralty Islands, probably reflects a paucity of collecting rather than a real absence.

c). *Karkar Island:* Dr. H.G. Cogger, Deputy Director and Curator of Reptiles and Amphibians at the Australian Museum, collected extensively on Karkar Island, approximately 60 km north of Madang, in September-October 1965 and August 1969 (Cogger, 1966, pers. comm.), the latter visit being made during the Alpha Helix Expedition to New Guinea. Twenty-seven specimens of *T. gigas* collected by Dr. Cogger from four localities on Karkar Island were lodged in the Australian Museum collection. These specimens and accompanying data are given in Table 1.

Bangama, Miak and Gamog are in areas of secondary forest and gardens with patches of rain forest, while Gauben is associated with major plantations (Cogger, pers. comm.). Bangama, Miak and Gauben are situated on the coast of Karkar Id, while Gamog lies just above the 150 metre contour line.

T. gigas occurs on the adjacent New Guinea coast, AM R19075 coming from Madang.

Dr. Cogger's field notes give the following description of colouration of living adult and neonate *T. gigas* from Miak.

Adult — "Dorsal surface of body a mixture of black and a rich olive brown. Upper surface of head, and sides of head, light olive grey, the sutures between the scales generally lined with black (including the labials, giving a barred appearance). Sides and limbs mainly black, with scatterred olive-brown or yellow scales and/or flecks. Throat essentially grey, with a few black scales; chest and belly a mixture of light grey and black scales. The whole ventral surface is suffused with a light pink or salmon colour. The black scales on the back are arranged roughly in cross-bands."

Neonate — "Dorsal ground colour a light olive-yellow, some scales with one (seldom more) dark brown fleck. Nine distinct black cross-bands between the forelimbs and the base of the tail. The cross-bands are irregular and sometimes broken. Head olive-grey, scale sutures in black. Sides of body largely black, with olive-yellow scales descending the sides from the

dorsum and whitish scales ascending from the ventral surface. Throat whitish, but with a slight salmon-coloured suffusion. A very few scattered black flecks. Chest and belly a mixture of black and white (almost light grey) scales. Tail the same."

Discussion:

The most recent literature records of *T. gigas* from islands other than New Guinea are given in Table 2, along with the museum housing the specimens referred to in each case.

Barbour (1912) has suggested that Boulenger's (1887) record of *T. gigas* from Java (Bantam) may be based on an erroneous locality for the specimen. Barbour was apparently unaware of at least two other records of *T. gigas* from Java. Werner (1910) lists a specimen from Buitenzorg and one of the types of *Cyclodus boddaerti* Duméril and Bibron, 1839, a synonym of *T. gigas,* is given as collected in Java by Kuhl and Van Hasselt. However, the apparent lack of any records of *T. gigas* from localities between Java (and Sumatra) and the eastern Moluccan islands (Auffenberg, 1980; Mertens, 1930) suggests that even if *T. gigas* does occur in Java and Sumatra, the populations there have been introduced, probably by the trade between the Moluccas (formerly the Spice Islands) and the major trading centre of Java in the 17th and 18th centuries (Barbour, 1912).

T. gigas does not occur in the Solomons (Barbour, 1921; Kinghorn, 1928; Schmidt, 1932; McCoy, 1980) and has not been recorded from the islands of the Bismarck Archipelago (Werner, 1898, 1899, 1900; Hediger, 1934; Brown, 1955). If this absence is real, it suggests that *T. gigas* may have been introduced to the Admiralty Islands.

Tiliqua gigas has the most northerly distribution of the skinks placed by Greer (1979) in the *Egernia* group of the Lygosominae, being the only species to reach the northern hemisphere.

Acknowledgements

I would like to thank Dr. Allen Greer and Dr. Harold Cogger for their assistance and encouragement throughout this study. Dr. Cogger kindly allowed me to use his unpublished field notes. Dr. David McAlpine kindly identified Vogt's "French-inseln".

TABLE 1

Tiliqua gigas specimens from Karkar Island.

	Date of Collection	Locality	
AM R24861	7 October 1965	Bangama	4°32'S 145°59'E
AM R24862-69	4 October 1965 *	Miak	4°34'S 145°55'E
AM R24908-15	—	Miak	"
AM R25145	—	Miak	"
AM R25387-89 **	—	Miak	"
AM R25390	9 October 1965	Miak	"
AM R25681-83	4 October 1965	Gamog	4°42'S 145°56'E
AM R26000	—	Karkar Id.	—
AM R28678	22 August 1969	Gauben	4°44'S 145°54'E

* Date of birth

** AM R25389 gave birth to 14 young.

TABLE 2

Records of distribution of *Tiliqua gigas* on islands.

Island Group	Island	Locality	Authority	Museum *
D'Entrecasteaux Group				
	Goodenough		Burt and Burt (1932)	AMNH
	Fergusson		Burt and Burt (1932)	AMNH
Witu (= French) Islands			Vogt (1912)	ZMB
Schouten Islands				
	Japen (= Jobi)		Peters and Doria (1878)	MSNG
Aru Islands				
	Terangan	Ngauguli	Roux (1910)	NHMB
Kei Islands				
	Kei-Dulah	Tual	Roux (1910)	NHMB
	Langgur		Roux (1910)	NHMB
	Gross-Kei	Elat	Roux (1910)	NHMB
Tenimbar Islands			Kopstein (1926)	RMNH
Moluccas				
	Ambon **		Kopstein (1926)	RMNH
	Ceram	Wahai	Barbour (1912)	MCZ
	Misool		Boulenger (1887)	BM
	Ternate		Barbour (1912)	MCZ
	Halmahera		Boettger (1895)	SMF
	Morotai		Tanner (1950)	BYU
Indonesia				
	Java	Bantam	Boulenger (1887)	ZMB
		Buitenzorg	Werner (1910)	MRHN
	Sumatra		Werner (1910)	MRHN
Ungrouped				
	Tanpora		Mitchell (1950)	SAMA
	Soron		Petera and Doria (1878)	MSNG

* Acronyms follow Duellman, Fritts and Leviton (1978)

** Type locality of *Tiliqua gigas*

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SOME COMMENTS ON THE DISTRIBUTION OF LIZARDS ON ISLANDS IN THE HEN AND CHICKEN GROUP NORTH—EAST NEW ZEALAND

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The Hen and Chicken Islands are situated off the North-East coast of the North Island (Lat. 35°50'S, Long. 174°45'E). The distribution of lizards on Lady Alice Island and Pupuha Island show the possible effects that rats may have on New Zealand's native lizards.

Although the islands are less than one kilometre apart, only one species, *Hoplodactylus duvauceli,* was found on both. The Kiore or Polynesian Rat (*Rattus exulans),* is present on Lady Alice Island but absent from Pupuha.

Whitaker (1973) noted that the lizard species most vulnerable to rat predation or competition are nocturnal ground-dwellers which are large in size and forage in the open. A fifth character can be added; forest-inhabiting species which are confined to the interior of the island, as opposed to the beaches and cliffs which provide some protection in the form of rock piles and crevices.

The skink, *Cyclodina oliveri,* exhibits all of the above characters. It has been recorded from Pupuha and Muriwhenua Islands and Middle Stack, in the Hen and Chicken Group (Whitaker 1973). It has not been found on Lady Alice Island. *C. oliveri* has never been found on an island where rats are present (Whitaker 1978). Before rats were introduced to New Zealand it is likely that the distribution of *C. oliveri* was more widespread.

Two widespread species of *Cyclodina, C. ornata* and *C. aenea,* were located on Lady Alice Island but not on Pupuha Island. Both are smaller than *C. oliveri* and forage almost totally beneath cover and so could be expected to be less vulnerable to rats. However, only four *C. ornata* and two *C. aenea* were found on Lady Alice, which suggests Kiore may also be affecting these species. These facts are contrary to that of Whitaker (1973 and 1978) who claimed that the skink *Sphenomorphus pseudornatus* (probaly synonomous with *C. aenea*) appeared to be relatively uneffected by rats. It does seem, however, that *C. ornata* is effected by Kiore to a lesser extent than *C. aenea,* as several specimens of the former species were located in the bush near the centre of the island where little cover is available to provide protection against rat predation. Both specimens of *C. aenea* were found on the beach, an unusual habitat for this species. The apparent absence of *C. ornata* and *C. aenea* from Pupuha Island is probaly due to the small size of the island (about one hectare) and the lack of habitat diversity.

Two other skinks were found on Lady Alice but not on Pupuha Island, these

are *Leiolopisma smithi* and *L. moco.* Because of it's habitat preference, *L. smithi* may be less vulnerable to Kiore than *L. moco.* The former species is solely a coastal lizard whereas *L. moco* is primarily an inhabitant of open grassland and scrub. On Lady Alice however, all but one specimen of *L. moco* were found on the boulder beaches and cliffs. Overall densities of both species, as compared to other islands, were much lower than expected indicating possible Kiore interference.

Hoplodactylus duvauceli is a large gecko with an average snout-vent length of 130-140 mm. Consequently adults of this species are probably too large to be taken as food by Kiore. Only two juveniles were located (one to two years old), thus the rats possibly prey on young individuals and consequently inhibit successful recruitment of this species. Because of the longevity of *H. duvauceli,* the population on Lady Alice Island may take some time to be wiped-out by the Kiore. This gecko is currently confined to the boulder beaches and cliffs of Lady Alice Island. It is conceivable that they were originally distributed over most of the island as they are on certain rat-free islands. (e.g. The Poor Knights Islands).

The occurrence of *H. duvauceli* on Pupuha Island is a new locality record for this species. Only one specimen was found, thus further investigation is needed to assess it's status on this island.

The gecko *Hoplodactylus pacificus* was found to be very common on Pupuha Island, but absent from Lady Alice. Whitaker (1973) notes that this species is very susceptable to Kiore predation (though it is likely that his *H. pacificus* is synonomous with *H. maculatus* (Robb and Rowlands 1977)). Although not sighted, *H. maculatus* has also been recorded from Pupuha Island, but is absent from Lady Alice Island. The reason for the absence of *H. maculatus* from Lady Alice is unusual as it is frequently found on the beaches where rats are known to be present.

The lizard species composition of New Zealand's offshore islands is clearly dictated by several insular characteristics, not the least of which is the presence of Kiore. If these rodents had not been introduced onto Lady Alice Island it is very likely that it's herpetofauna would be more diverse and more dense. Human interference by burning off the vegetation may have reduced the species compliment even further. Destruction of the vegetation may have exterminated two common arboreal geckos, *Hoplodactylus granulatus* and *Naultinus elegans.* Thus it is possible that Lady Alice Island may once have had a lizard fauna of ten species.

Obviously it is imperative to protect these lizard species by taking all precautions to ensure rats do not colonise new and vulnerable islands. This applies not only to Kiore but to brown rats (*Rattus norvegicus)* and black rats *(Rattus rattus).* The effect of these species on native lizards has not been investigated fully, but they are known to be more aggressive than Kiore and thus pose an even greater threat to these vulnerable reptiles. To keep islands free of these rodents is an arduous task, but it is crucial if New Zealand is to maintain it's small but priceless herpetofauna.

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FURTHER NOTES ON BREEDING DEATH ADDERS
(ACANTHOPHIS ANTARCTICUS) IN CAPTIVITY.

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Introduction:

Death adders occur throughout most of mainland Australia and on many offshore islands. The Common Death Adder *Acanthophis antarcticus* the Desert Death Adder *Acanthophis pyrrhus* and *Acanthophis praelongus* are the three species represented in Australia, while *Acanthophis laevis* occurs in New Guinea.

The common Death Adder *Acanthophis antarcticus* tends to prefer coastal plains, forests, and sand dune communities, and these areas in many places are being destroyed. In South Australia land clearing (South Australian Department for Environment 1980) grazing and urbanisation have drastically reduced its numbers. While it is still abundant in the pockets of virgin land left in National Parks, Conservation Parks and other uncleared areas, a warning should be heeded now that habitats remaining should be retained.

To safeguard against any drastic reduction in population it is imperative that captive breeding techniques are developed and recorded. Captive breeding of *Acanthophis antarcticus* has occurred a number of times in Whyalla (Mirtschin 1976 and Hudson 1979) sometimes with unfavourable results. This paper records the history of Death Adder breeding in Whyalla.

A summary of previous and new results are presented in Table 1.

Breeding Methods:

The snakes were housed either in constant temperature environments on public display at the Whyalla Fana and Reptile Park or were housed in pens inside a galvanised iron shed and subjected to daily and seasonal temperature fluctuations. In the latter case, heating pads and holes in the floor 300mm diameter and 300mm deep were supplied for voluntary temperature regulation.

Normal photo-periods were obtained in both cases via natural light panels in the roof, however the former method had additional 20 watt fluorescent lights which were manually switched off at the end of the day.

Up until 1981, considerable difficulty was experienced with deformities and stillborn young. It was proposed that excess heat may have caused the problem. Heating was excessive because of hot ambient temperatures (36°C), from heating pads set in the floor, or from overhead cage infra-red lights.

To experiment, the heating pad was switched off for Group F from Nov. — Mar. and left on for Group H. Another two Groups G and E were kept at a constant temperature of 29°C. During the final stages females G and F were transferred to isolation pens. The female in H Group was not expected to be gravid, and was not observed. Infertile eggs from this female were found during cage cleaning. Results of these later experiments are summarised in Table 2.

Growth Rate Study:

From the 10 live young produced from mating D (Table 1), growth rate studies showed that in the first twelve months from birth, Death Adders are capable of growing at a parabolic growth rate (Mirtschin and Davis 1982). The approximate relationship being:

$W = 1.2T^2$ where 1.2 is a constant
T = time in months
W = weight

The weight increases for the four specimens are shown in Table 3.

The juvenilles were fed entirely on mice. Initially day old pink mice were used; as the snakes grew they were fed larger mice. Juvenile Death adders do not

take mammals in the wild (Shine 1980), so for this experiment they were forcibly initiated to this type of food. the technique was simple and highly effective. The young mouse was forced into the snakes mouth and held there until the snake clamped its jaws. The restrained head of the Adder was slowly released and after a short time the snake would usually commence swallowing the mouse. Quite often a number of attempts were made before the snake finally swallowed the mouse. This technique was required for the first 6—9 months after which they commenced to feed on their own. They became quite used to the technique and usually ate the mouse without force feeding after a few months.

TABLE 1

Death Adder Births at Whyalla.

Group	Date	Time of Birth	Temp at Birth	Total Born	Number Dead at Birth or Shortly After	Deformed
A	10/3/76	2400-0730	> 20°C	24	8	Nil
B	20/3/76	2400-0800	> 20°C	19	2	1
C	13/3/77	—	?	10	10	Nil
D	10/3/79	2400-1130	?	24	14 (Most deformed)	2 (live)
E	28/1/81	2000-1200	29°C	11	3	Nil. One had a peculiar nervous disorder. Lack of normal control of body.
F	3/2/81	1800-0800	31°C	18	2	16 normal juveniles
G	15/3/81	1800	—	Nil	—	All eggs infertile except one partly formed embryo.
H	25/4/81	—	29°C constant	Nil	—	All eggs infertile.

TABLE 2
BREEDING DATA OF DEATH ADDERS

GROUP	BREEDING MATERIAL SOURCE	AGE OF SPECIMEN	RATIO ADULTS Males : Females	HEAT SOURCE	PHOTOPERIOD	OFFSPRING	COMMENTS
G	Male Tumby Bay Female. Pt. Germein. Male. Dormant Captive born.	Unknown Unknown 4 - 8 years	2 : 1	Constant about 29°C Infra-red	Sky light allowed natural day/night	All infertile eggs except one partly formed embryo.	
E	Male. Captive born Male. Captive born deformed back. Female. Captive born.	19 months at mating both males were involved. (All were from same clutch).	2 : 1	Constant about 29°C Infra-red	Skylight allowed natural day/night.	11 — 3 died, 1 had acute nervous disorder.	Parents yellow—brown. Offspring all appear variants of parents, ranging from dark orange to light cream bands, light brown to dark brown base colour.
F	Male. Middleback Ranges. Female. Middleback Ranges Male. Dormant	Unknown. Unknown Unknown	2 : 1	Ambient heat. Refuge available via 360mm deep hole in concrete floor.	Natural day/night.	18 — 2 died	Parents both red. Offspring red.
H	Female. Middleback Ranges Male. Middleback Ranges	Unknown Unknown	1 : 1	Ambient and heat pad. 360mm deep refuge hole available in concrete floor.	Natural day light	All infertile eggs	

TABLE 3
Weights are expressed in grams.

	March	June	September	March
Specimen A	5.02	12.11	34.29	165
Specimen B	5.32	14.54	29.61	122
Specimen C	4.39	12.55	38.66	168
Specimen D	5.18	11.16	31.32	152

Discussion:

Information supplied in this paper should be of assistance to others experimenting with this species. It appears that constant temperature enclosures are adequate for breeding purposes but incorrect temperatures may cause stillborn young or deformities. The ratio of 2 males to 1 female could be significant, but needs more investigation.

A preliminary conclusion may be drawn that keeping Death Adders with seasonal and daily temperature fluctuations is more successful. It is felt however, that given an optimun temperature, constant temperature environments may be just as successful. Certainly at this stage others attempting breeding would be advised to use the variable temperature method until more experimental work is carried out.

Growth rates achieved with these Death Adders are far greater than would normally occur in the wild (Shine 1980), however it is useful information for captive breeding colonies and demonstrates growth potential. One interesting point is that both male and female Death Adders have the capacity to be sexually mature at 19 months as occurred with the captive bred specimens in group E. This makes an interesting comparison with Shines (1980) findings of wild Death Adder maturity of 24 months for males and 42 months for females. Captive breeding of Death Adders for rehabilitation of areas where Death Adders have become extinct could be useful conservation practice if habitats are restored. Rehabilitation from captive bred stock could also be used in bolstering diminished populations such as that which occurred when non-target poisoning was carried out on York Peninsula, South Australia, during a mouse plague (Gilbertson 1981).

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OBSERVATIONS ON SOME MEMBERS OF THE GENUS *TILIQUA*

by Australian Herpetological Society Members. (ed. G. Shea).

Summary: Tiliqua gerrardii and *T. scincoides* were discussed in detail, and miscellaneous observations on *T. nigrolutea, T. casuarinae, T. multifasciata* and *T. rugosa* were also noted.

Methods: Members' observations were recorded on 26th March, 1976, using a similar method to that used in A.H.S. (1976).

Results:
Tiliqua gerrardii (Pink-Tongue Skink)
a) *Breeding*

G. Stephenson *states that females kept in captivity have bred once annually in 1975 and 1976. One female had 17 young (live-born) in January 1976, of which one was deformed. After birth the young eat the embryonic sac and then become active. D. Millar* notes that a specimen from Bundaberg (Qld) had 27 young. *M. Maddocks* had a female from Turramurra (N.S.W.) which had 8 young. *D. Millar* suspects that escaped adults subsequently bred in the Sydney suburb of Croydon, as he found a juvenile in the district.

b). *Feeding*

G. Stephenson's captive specimens feed on slugs, snails and banana, the young only on snails. Some specimens died after being fed on a diet of raw meat only. *P. Rankin* had a large specimen which ate nothing but snails and slugs. When the supply of such foods became limited, and exposed meat was ignored, a piece of meat placed inside a snail shell was eaten. This suggests that the snail shell itself could be a stimulus for feeding. *P. Ludowici,* when collecting snails in the Currumbin rainforest (Qld) during the summer of 1972/73, noted 5 or 6 *T. gerrardii* in two patches of rainforest within an area of approximately 3-400m radius. They were found along the margins of a creek at the edge of two partly cleared areas bordered by pine trees, which were also the only areas where the Common Garden Snail (*Helix spp.)* was found. A smaller snail *(Mitor sp.)* was also present, but only broken shells of *Helix* were seen under and beside the logs and piles of rotting leaves where the *T. gerrardii* were found. This suggests that this species may be a highly selective feeder. *M. Maddocks* notes that captive juvenile *T. gerrardii* and other *Tiliqua* show no interest in vegetable matter. *G. Stephenson* has observed the species in banana plantations at Coff's Harbour (N.S.W.) and suggests they may feed on fallen bananas there.

c) *Habits*

G. Stephenson has found that specimens on the road at night are very alert and quick to retreat. *P. Ludowici* states that specimens at Currumbin were seen feeding during the late afternoon to dusk period and moved around until about 2300-2330hrs. They appeared to then retreat and come out again at about 0400hrs the following morning. *D. Millar* suggests that they are crepuscular rather than nocturnal.

G. Stephenson has noted that they come out after rain in the natural state, probably since this also brings out the snails. This has also been found to happen in the case of captive specimens when the cage is sprayed with water.

P. Rankin observed a cat walking across the road near Coff's Harbour with a large *T. gerrardii* in its mouth.

Tiliqua scincoides (Common Blue-Tongue)

a) *Breeding*

G. Daly caught a female and placed her with a male in a 2 × 3m pit. Soon

afterwards, the male grasped the female in the neck region, his tail wriggling, and mating followed. There was no apparent courtship. About 3 months later 6 young were born, of which 2 were deformed and still-born and the others deformed by a curvature of the spine. *P. Rankin* has seen one specimen preserved in a collection, fully grown, with a similar spinal condition.

W. Stephenson had one female which had 16-18 young one season. *M. Maddocks* had a female deliver 15 young on 20/2/1976, of which one or two were apparent weaklings, and had fused scales on the head. A difference of almost 2cm occurred between the largest and the smallest specimens, the smaller individuals being less interested in food. The other juveniles would only take moving food. *R. Brown* has an adult specimen with fused head scales which was found as an adult in good health. *M. Maddocks* has found that gravid females become less active and feed less. *P. Harlow* raised a female from birth in captivity and when 4 years old, she had 9 young. She appeared large enough to breed when 3 years old and was kept in an 8 × 2m outdoor enclosure during growth.

b) *Feeding*

M. Maddocks has observed specimens at Turramurra and in Adelaide eating dandelion flowers in the natural state. At Turramurra, about 4 or 5 *T. scincoides* (one released there) have been observed for a few years, living under a large flat rock beside a creek. They have been seen feeding on the leaves of lantana bushes growing in the area. *R. Brown* has a specimen which chases and kills mice and frogs, trapping them in the corner of the cage. *P. Rankin* dissected a specimen found dead on the road near Lismore and found the stomach contents consisted entirely of clover, dandelions etc. *M. Maddocks* observed specimens in an Adelaide National Park scavenging apple and scraps at about 2300hrs one warm evening. He also had a sub-adult from West Pennant Hills (N.S.W.) which caught and ate *Lampropholis mustelina* and other small grass skinks. *G. Daly* dissected a specimen found dead on the road in February 1976 at Condell Park (N.S.W.), and the stomach contained the remnants of snails and part of a dog's faeces.

c) *Territoriality*

M. Maddocks has a 7m diameter enclosure containing rocks and logs, in which some *T. scincoides* are kept. The larger specimens appear to have dominance over the others, sunning on the most suitable rocks, etc. Once the smaller specimens have established a territory, the larger males do not go near it. The specimens also feed in their respective areas. *G. Daly* has noticed that males from the same litter which have grown up together do not exhibit dominance over each other. When strange males are introduced, however, the original males appear to defend their territory.

d) *Life Span*

P. Harlow has kept some specimens for 9 years, and has heard of another person keeping a specimen for 14 years, when it died in quite a healthy state after an accident. He suggests they may live for 20 years or more.

e) *Hybridisation*

D. Millar mentioned that hybridisation between *T. scincoides* and *T. nigrolutea* (Blotched Blue-Tonge) has been reported in the literature (Longley, 1939, 1941, 1944; Worrell, 1963), but has not been seen in the wild. *G. Stephenson* found a female *T. nigrolutea* at Wentworthville (N.S.W.) which had probably been released or escaped, and which gave birth to 9 young (4 still born). The female was almost black, with yellowish markings, while the young were much more colourful and looked like a cross between the two species, as they had the typical bands of *T. scincoides* (which were yellow) and also some scattered yellow spots. He added that a captive *T. nigrolutea* has a distinct liking for mice and will kill and eat them at

any age. It also catches and eats live frogs.

Tiliqua casuarinae (She-Oak Skink)

a) *Breeding*

P. Rankin had a female of this species from the Wattagan State Forest (N.S.W.) which was 42cm long and had 11 young, one still-born. *M. Maddocks* kept a male and female from Dapto (N.S.W.) in a cage, and after the female produced 4 young, the male ate two of them. This incidence of cannibilism may well have been induced by the captive conditions. *G. Daly* notes that the snout-vent length of females seems to increase when they are gravid.

b) *Habitats*

M. Maddocks found 6 or 7 specimens at Dapto in August 1974 active and feeding around 2300hrs on a warm evening.

Miscellaneous Observations on Other Species

a) *Sloughing*

P. Rankin states that during sloughing in *T. nigrolutea* and *T. rugosa* the skin comes off in almost one entire piece. Some shed the body skin with the leg skin too, but mostly the leg skin comes off after that of the body. They often bite it off and will sometimes eat the skin. *M. Maddocks* states that it generally takes about 4 days for the sloughing process to be completed, and the specimen consumes a lot of water about 2 days beforehand and usually goes off food about 3 weeks prior to sloughing. *P. Ludowici* suggests the use of small quantities of Terramycin if the shedding leg skin strangles the limb, causing skin problems and eventually necrosis.

b) *Nocturnal Activity*

P. Rankin has often found *T. multifasciata* out at night, particularly in the Northern Territory. He also observed one *T. scincoides* active at midnight during a hot summer evening at Tibooburra (N.S.W.), after a very hot day, and suggests that nocturnal activity may be commonplace when it is too hot during the day.

Acknowledgments

Glenn Shea for drawing attention to and revising the original notes for publication.

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NOTES ON THERMOREGULATION & HEAT CONDUCTION IN BABY *LEILOPISMA MOCO*

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Some observations of thermoregulatory behaviour in baby *Leiolopisma moco* are described. The use of the theory of heat conduction in studying thermoregulaion is illustrated by solving a simple model of a lizard on a rock. Controlled experiments

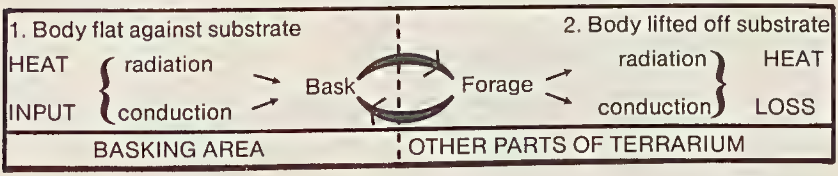
based on this type of analysis are suggested as a means of probing the temperature preferences of basking lizards. The main purpose of this article is to stimulate thought and discussion.

Since the physical factor of greatest importance in lizard ecology is temperature, one would expect the quantitive analysis of heat exchange with the environment to be a useful tool in understanding lizard biology. A useful summary of the heat exchange channels is given by Heatwole (1976). Bartlett and Gates (1967) have included many of these channels in an equilibrium equation describing a lizard on a tree trunk, but the model is too complicated to be of direct use (except perhaps for computer simulation) because it describes a field situation with a large number of variables. In the laboratory one would hope to obtain solvable models by reducing the number of variables.

At the end of February (1980) one of my *Leiolopisma moco* gave birth to three young in an outdoor cage. *L. moco,* being a bold, sun-loving skink, provides an easy subject for thermoregulation studies. In outdoor cages it is frequently seen basking in parts of the cage where sunlight has penetrated. In fact I have observed my baby *L. moco* chasing moving sunlit regions created by reflecting a narrow beam of sunlight into the shaded terrarium using a swinging mirror.

Indoors the young can be induced to bask by placing a lamp above the terrarium, and it does not take long for the skinks to gather under the bulb (I used a 25W tungsten bulb in a conical mount, about 10cm above the irradiated surface), sometimes less than 2 minutes. The best basking surfaces appear to be smooth and not too curved so that the lizard can warm itself by substrate conduction, probably the most effective channel for controlling body temperature, especially for small skinks. Using a flat, uniform block of wood, the following cycle of behaviour was noticed:

FIGURE 1



Thermoregulatory behaviour of types 1. and 2. was noted by Robert Porter (1978) for the nocturnal skink *L. suteri.*

By creating environments at temperatures above and below the so called preferred body temperature (PBT) one would expect to observe shuttling behaviour. A convenient way of doing this in the above set up is to divide the basking surface symmetrically into a light and a dark region (e.g. using white and black cardboard). These regions absorb radiation differently, the dark surface becoming considerably warmer than the light one. The skinks can then be observed to oscillate between basking surfaces, moving from light to dark after cooling down, and dark to light after heating up. For my baby *L. moco* the period of this oscillation is of the order of a few minutes; one would expect larger individuals to show longer periods. By measuring this period, and the thermal conduction properties of the skink and substrate, their absorption spectra etc. one should be able to calculate the average body temperature of the animal at the moment it moves to a different surface. As an example consider the following simple model. Suppose the lizard moves from a hot surface of temperature T_1 to a cool surface of temperature $T_2 < T_1$, where it proceeds to loose heat by conduction until its average body temperature has fallen from T_1 to $u_L \cdot T_2 < u_L < T_1$. Assume the substrate temperature to be constant and neglect heat exchange by radiation and convection. Approximate the skink by a rectangular block as shown:

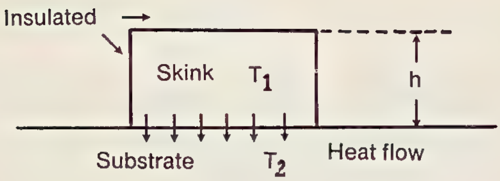


FIGURE 2

Assume the block is of uniform composition, of height h, characterised by thermal conductivity K, specific heat C, and density p. Hilyard and Biggin (1977). Neglect metabolic heat production and variation of K, and C in space and time. Let y be the height of a point in the block, t the time. The temperature distribution, u (y, t), in the block satisfies the heat equation, Carslaw (1921), Young (1972).

$$\frac{d^2u}{dy^2} = \frac{pC}{K}\frac{du}{dt} \qquad \text{.......(1)}$$

with boundary conditions:

$$u(o,t) = T_2 \qquad t \geqslant o \qquad \text{.......(2)}$$

$$u(y,o) = T_1 \qquad o \leqslant y \leqslant h \qquad \text{.......(3)}$$

$$\frac{du}{dy}(h,t) = o \qquad t \geqslant o \qquad \text{.......(4)}$$

Solving this by separation of variables gives:

$$u(y,t) = T_2 + \sum_{n=o}^{\infty} \frac{4(T_1 - T_2)}{(2n+1)\pi} \sin\left(\frac{(2n+1)\pi y}{2h}\right) \exp\left(-\frac{(2n+1)^2\pi^2}{4h^2}\frac{K}{pC}t\right)$$

Take the first term in this expansion and average over the block if Δt is the time required to cool to the temperature u_L then:

$$r = \frac{u_L - T_2}{T_1 - T_2} \cong \frac{8}{\pi^2}\exp\left(-\frac{\pi^2 K \Delta t}{4h^2 pC}\right)$$

Put in some crude values to estimate the ratio r:

$K \simeq 1{\cdot}2 \times 10^{-3}$ cal gm^{-1} s^{-1} $^oK^{-1}$

$C \simeq 1$ cal gm^{-1} $^oK^{-1}$

$p \simeq 1$ gm cm^{-3}

$\left.\begin{array}{l}\Delta t \simeq 120 \text{ s} \\ h \simeq 0{\cdot}3 \text{ cm}\end{array}\right\}$ for baby *L. moco*

$T_1 \simeq 30^oC$

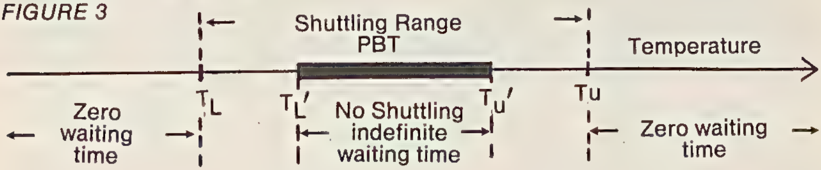
$T_2 \simeq 18^oC$

$\therefore r \simeq \frac{8}{\pi^2} e^{-0{\cdot}4\pi^2} = 0{\cdot}02$

$u_L \simeq 18{\cdot}2^oC$

Thus it appears that if there is a lower limit temperature, T_L whose attainment immediately causes the lizard to move from its position to return to a warmer surface, then T_L is less than 18°C (the definition of an upper limit temperature Tu being analogous), since the exponential has effectively decayed to ~18°C in about 90s. So there is a "waiting time" of about 30s before the lizard moves back to the higher temperature. One would expect the waiting time to be smaller at lower values of T_2, and to fall to zero when T_2 is reduced to T_L. There may be a narrow temperature range. $[T_L', Tu']$, contained in $[T_L, Tu]$, in which no shuffling occurs, as shown in Figure 3.

FIGURE 3



If the parameters T , Tu do have meaning, they could be measured by decreasing T_1 and increasing T_2 sufficiently. This is a very simple sort of model—can anyone suggest other factors which determine a skinks shuttling behaviour, or improve on the concept of "shuttling range"?

T_L and Tu are called "minimum voluntary temperature" and "maximum voluntary temperature" by Cowles and Bogert (1944). Behaviour is postulated to be unrelated to temperature in the range between T_L and Tu (this implies $T_L = T_L'$, $Tu = Tu'$. Heath (1970) proposed that T_L and Tu control the lizards thermoregulatory behaviour. Based on the observation that these temperatures are stochastically distributed, Barber and Crawford (1977) have formulated a stochastic model which predicts a steady-state distribution of body temperatures agreeing with field and laboratory data. Operant behaviour studies by Garrick (1979) on *Sceloporus cyanogenys* (Iguanidae) indicate that T_L and Tu depend on external factors such as the intensity of the heat lamp. It is possible that these parameters are merely convenient phenomenological devices which provide a simple way to think about lizard regulatory behaviour, and may have no meaning in a more complex model of the thermoregulatory control system (or "thermostat"). One could probe this system by investigating the dependence of waiting time on T_1 and T_2.

A better experimental set-up would be obtained by replacing the basking surfaces by thermostatically controlled hot-rocks, eliminating the lamp making sure the lizard (s) is (are) well fed before beginning, so that the cycle of Figure 1. does not interfere. The theoretical analysis can be refined by using a realistically shaped variable lizard cross section and taking radiative and convective heat exchange channels into account. More accurate values of K, p and C can be used when precise measurements have been made for skink tissues. (see e.g. method in for Avery (1979)). For big fat skinks (*L. homalonotum, Cyclodina alani)* K could be allowed to vary over the cross section.

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HERPETOLOGICAL NOTES

ON THE LIFE HISTORY OF THE GREEN—EYED FROG *LITORIA EUCNEMIS* (Lonnberg) *(Amphibia: Hylidae)*

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During a recent visit to the Kuranda area of Northern Queensland, an amplectant pair of *Litoria eucnemis* was taken in a shallow rocky section of a mountain stream immediately to the north-east of the Kuranda Wild Life Sanctuary. The stream which flows through thick rainforest is situated within 50 metres of the sanctuary. The pair was collected at approximately 1600 hours on 25 July, 1981. This species is easily recognisable as both sexes posess distinctive fringes along the outer margins of the forearm and foot (Barker and Grigg 1877).

The male had a snout vent length of 40mm and the female 67mm. Soon after capture the pair separated. While examining both specimens the female released several eggs, probably as a result of being held too firmly. The eggs were black at one pole and creamy-yellow at the other. On close examination it was discovered that the male possessed distinct nuptial pads on the dorsal and inside surfaces of the thumbs. These pads, which extend from the base of the thumb to a point directly above the distal subarticular tubercle of the thumb, are blue-grey in colour. The thumbs are not noticeably swollen and the pads are smooth, bearing no spines. After measurements and photographs had been taken the specimens were released at the point of capture.

Apparently no breeding data are presently available for *Litoria eucnemis.* In the genus *Litoria,* breeding occurs mostly in spring and summer (Barker and Grigg 1977). The above observations indicate that breeding activity in *L. eucnemis* may commence earlier. However, it is worth considering this species as being an opportunistic breeder as two evenings previously a heavy shower of rain fell in and around Kuranda. It is possible that at the onset of the more regular rainfall period during the spring and summer *L. eucnemis* may well have a more fixed breeding season.

Reference:

Barker, J. and Grigg, G. (1977): A field guide to Australian Frogs. Rigby Limited, Sydney.

NOTE ON THE MAINTENANCE OF A LITTLE SPOTTED SNAKE *(Denisonia punctata).*

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On 31st October, 1980 a little spotted snake *(Denisonia punctata)* approximately 60 cm long came into my care and was placed into a glass vivarium measuring 90cm × 35cm × 55cm using red sand as substrate. Heating was provided by a 65 watt carbon filament lamp. Natural cover was supplied in the form of a hollow tree limb, large tussock and a concave piece of bark. The tree limb alone was used by the snake. On several occasions during the day and at night the snake was observed burrowing into the sand. This snake was often seen fully submerged in the water dish, or with at least the fore part of the body including head submerged. It seemed to be exploring every corner of the water receptacle.

A wide variety of food was offered and it was found that the snake fed principally on Geckos *(Oedura lesueurii* and *Diplodactylus vittatus).* It also accepted pink mice and garden skinks *(Lampropholis guichenoti)* occasionally. The author was bitten on the right index finger by this snake. This resulted in local swelling and the finger was sore to touch, these symptoms subsided after 30 minutes.

COMMUNITY EGG LAYIG BY THE YELLOW—FACED WHIP SNAKE *(Demansia psammophis)*

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A large aggregation of egg-shells considered to be those of the Yellow-faced Whip Snake, *Demansia psammophis* was found in the Morton National park, near Bundanoon, N.S.W. in September 1979. In all 217 egg-shells were examined from the site, varying in length from 22mm to 36mm; some more may have been present, but not a significant number. They were all found under a single rock (approximately 1.5m by 0.8m) on a south-facing sandstone hillside in the sandy and fairly dry soil.

Of this number, 179 (82.5% approx.) had hatched, and showed from 2 to 6 slits, usually near one end and in several cases cutting the shell completely in two. 36 (16.6% approx.) had not hatched, but had been subsequently eaten out by insects. 2 eggs remained intact but completely dried out and solidified, these were apparently infertile.

There have been two previous records of large numbers of *Demansia* laying together. McPhee (1979) mentions "a record of approximately 200 eggs being discovered under one stone". More notable is that reported by Covacevich and Limpus (1972) where the number of eggs (in stages of development from recently laid to recently hatched) in a single system of ground crevices was thought to be between 500 and 600. The lengths of the eggs examined in that case were slightly higher (2.58 — 4.10 cm) than in the Bundanoon find, but this could be by the explained Bundanoon eggs having shrunk in drying.

Shine (1980) gives the range of clutch sizes in *D. psammophis* as 3—9, with a mean of 5.9. On this basis the aggregation consisted of about 36 clutches. There was no sure indication as to the age of the eggs, though the varying extent of deterioration suggests several years use of the site.

References:

Covacevich, J. and C. Limpus (1972): Observations on community egg-laying by the Yellow-faced Whip Snake, *Demansia psammophis* (Schlegel) 1837 (Squamata: Elapidae). Herpetologica 28(3), 208-210.

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Shine, R. (1980); Ecology of Eastern Australian Whip Snakes of the genus *Demansia.* Journal of Herpetology 14(4): 381-389.

UNUSUAL DEFENSIVE BEHAVIOUR IN THE CHILDREN'S PYTHON (*Liasis childreni*), GRAY 1842.

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Chris Harvey, (SAHG) 20 Crozier Tce., Oaklands Park. 5046.

On the 11th October, 1981, at approximately 2200 hrs., a male Children's Python was collected by us from the footslopes at Corunna Hills (32°44'S, 137°08'E).

The Children's Python is regarded as a very quiet and innoffensive species, which rarely bites even when first caught (Gow, 1976). The specimen we collected, however, exhibited very aggressive behaviour. When first captured, it appeared to be quite docile, but on subsequent handling it became highly agitated; flattening its body and repeatedly striking.

When the snake was picked up, however, it curled itself into a tight ball holding its head in the middle of its coils. (Fig. 1). It repeated this unusual behaviour throughout the next day, each time it was removed from its bag to be photographed, until its release the following night. When coiled in this position, it was extremely difficult to "unwind". This behaviour, of course, would make it very difficult for many predators to eat the snake, although it is hard to determine against which predator the python would use this defence.

From the literature, the only other snake to exhibit this behaviour is the Ball Python (*Python regius*), of Africa. Like the Children's Python, this snake too, is regarded as being docile and very disinclined to bite.

Reference:

Gow, G.F. (1976): Snakes of Australia Angus and Robertson.

Figure 1

NOTES ON FEEDING AND GROWTH RATES IN JUVENILE *Chelodina longicollis.*

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The following are observations on 5 *Chelodina longicollis* which hatched on the 9th and 15th April 1979, as reported in *Herpetofauna* Vol. 11 No. 2, February, 1980.

Four of the five hatchlings fed readily soon after birth but the fifth specimen did not develop any great taste for food until September 1979. During this winter they were kept in a heated tank.

They were fed on beef heart obtained from a Pet Shop, until September 1979 when the diet was changed to finely chopped steak. At this stage the fifth specimen started to eat as readily as the others. Perhaps it was just the more suitable food offering.

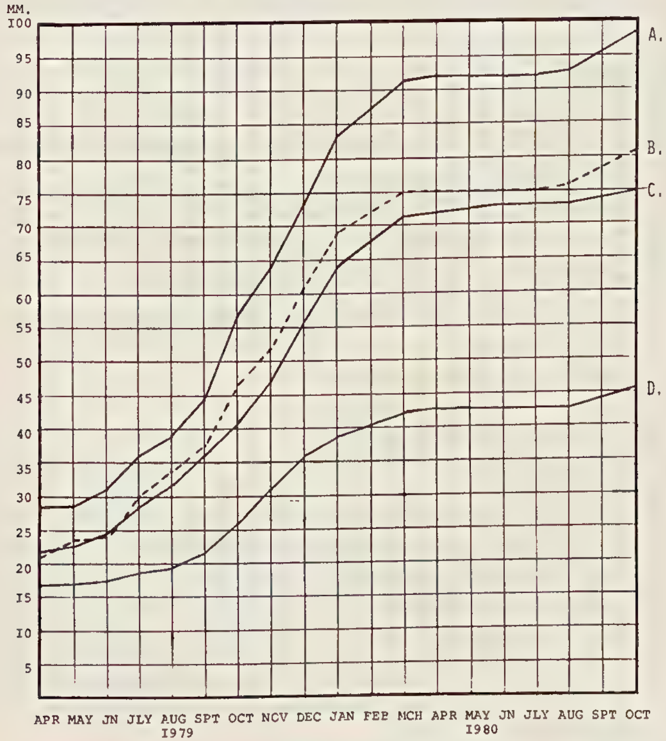
They were fed every second day and given as much as they could eat. This usually occurred very quickly, as they would attack their food ravenously.

They fed in this manner until February-April 1980 when they began to feed less frequently. They were not being kept in a heated aquarium during this period and became moderately inactive with growth rates considerably decreased. These months of reduced feeding coincided with Autumn and Winter in Melbourne.

Regular feeding recommenced in September, 1980.

CHELODINA LONGICOLLIS GROWTH RATES. (April '79 - October '80)

AVERAGE OF FIVE SPECIMENS.



A. CARAPACE LENGTH B. PLASTRON LENGTH C. CARAPACE WIDTH D. PLASTRON WIDTH

BOOK REVIEWS

Proceedings of the Melbourne Herpetological Symposium, Royal Melbourne Zoological Gardens, May 1980. C.B. Banks and A.A. Martin, Eds, Zoological Board of Victoria, P.O. Box 74, Parkville, Victoria. 1981. 199 pp. $12.00.
Copies available by application at the above address.

The volume presents the papers delivered at the Herpetological Symposium held at the Royal Melbourne Zoological Gardens in May 1980. The intention of the organizers was to provide the Australian herpetological community with the opportunity to exchange ideas and information. The Symposium not only successfully achieved its primary purpose, but also attracted contributions from herpetologists from other countries.

The Proceedings represent a pot-pourri of herpetological research and accurately reflects the diverse interests of those who participated in the Symposium. Because authors were not restricted as to the length and content of their papers to be published in the Proceedings, not all contributions appear in the same form. In about one-third of cases the information reported at the Symposium was either in press or in preparation for publication. The results of these studies are consequently represented by an author's abstract in the Proceedings. This probably will limit the utility of the Proceedings as a primary source of information.

The thirty-five contributions (each forming a separate chapter) are organized into nine subject areas. Slightly more than one-half of the papers consider various biological features of particular species. These are grouped according to higher taxonomic categories, but no general theme ties these groups together. The only exception involves several papers dealing with various aspects of venom research in snakes.

Eight papers are concerned with the management, diseases and conservation of amphibians and reptiles. Of considerable importance is P.A. Rawlinson's general arguments for a holistic approach to conservation practices and legislation. The remaining papers deal with the structure of herpetological communities and with specific systematic problems.

The papers and abstracts that have been published in this volume provide an overview of the directions of Australian herpetology, and that is where the strength of the volume lies. Although there is no single theme which could be used to characterize the volume, every herpetologist could find something that could be read profitably.

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"DANGEROUS SNAKES OF AUSTRALIA"
by Peter Mirtschin and Richard Davis. 207 pps. Rigby, Adelaide. Price $11.00

Dangerous snakes have fascinated man throughout history, and today in Australia, displaysof dangerous snakes still draw eager crowds. Books on dangerous snakes always find a ready market, especially in Australia, which has the dubious distinction of having the potentially most dangerous snakes in the world. Not surprisingly, the medical literature in Australia abounds in papers and correspondence on snakebite. It therefore is surprising that "Dangerous Snakes of Australia", is the first book on the subject, jointly written by a herpetologist and a medical practitioner, and published commercially. One could therefore hope for a book of great value to herpetologists and doctors alike, but alas, this is not the case, although the book is certainly interesting and most herpetologists will want to add it to their library.

The book is divided into two sections. The first section, "Identification and Conservation" is 148 pages in length and commences with a general introduction

to the venom toxocity of Australian snakes, based on recent work at C.S.L. Though brief, the information in this section is not available in other currently available books on Australian snakes. This is followed by a brief discussion on the biology and morphology of the snakes, and an introduction to identification of Elapid snakes. The diagrams in this section are good, but the distinction between legless lizards and snakes, and between Elapid and non-elapid snakes is inadequate. A series of colour photographs follow, and there is a large number of these, with all of the dangerous species illustrated. Unfortunately, the photographs are not of uniformly high quality, and although some are excellent, many are too dark. There are also too many illustrations of some species, especially the Tiger Snake group. Poor illustrations of such minor variations in colour and pattern are not worthwhile, especially when the far more difficult Brown-Western Brown Snake group is not covered as comprehensively. The three colour photographs of the bite site in snakebite victims are poor and of little value. The next section of the book, is a description of the morphology, habits, distribution, and venom toxicity of each of Australias dangerous elapid snakes. The authors choice of species for inclusion in this list is reasonable. The descriptions are adequate, the maps are sufficient, and the habits section includes some information not readily available elsewhere. The chapter on conservation of dangerous snakes is welcome, and basically sound, although in parts reflecting Mr. Mirtschin's own frustrations with fauna authorities. His call for a uniform Australia wide approach to conservation and protection of reptiles is sound.

The second section of the book, "Snake-bite and management", covers the clinical diagnosis, first aid treatment, hospital treatment, laboratory tests, venoms, history of antivenoms, and antivenoms. This comprehensive list suggests detailed coverage and suitability for doctors, but this is not the case, as all this is covered in a scant 30 pages, in patchy detail, and pitched at a level below that required by doctors involved in the treatment of snakebite. A number of statements suggests the author's relative lack of experience in managing snakebite, and lack of understanding of snake venoms and the mechanics of snakebite. The chapter on venoms is pathetically inadequate.

The book is completed with a glossary, bibliography, and index.

On the back cover of this book is the statement; "The book is essential reference material for the medical profession, especially in country areas. . . " I believe this statement is false. There are currently better works available for doctors (1-3), which give far more useful information, and while this book may be useful as an adjunct to identification of snakes, I do not believe it should be used as a text for the treatment of snakebite.

In summary, I feel that "Dangerous Snakes of Australia", falls short of its potential, and while it is a worthwhile addition to a herpetologists library, its place in the medical library is doubtful. Nevertheless, it will be an interesting book for the general public, and hopefully will sell well in that market.

Julian White. Consultant on Envenomation, Adelaide Children's Hospital. North Adelaide. S.A. 5006

1) Pearn, J. (ed) (1981) Animal Toxins and Man
The Division of Health Education and Information, Qld.

2) Sutherland, S. (1976) Treatment of snakebite in Australia and Papua New Guinea. Aust. Fam. Physician S;272-88. (since updated to include new first aid measures).

3) White, J. (1981) Ophidian envenomation: a South Australian perspective. Rec. Adel. Child. Hosp. 2(3); 311—421.

"ANIMAL TOXINS AND MAN"
edited by John Pearn. 134 pps. Division of Health Education and Information, Queensland Health Department, P.O. Box 155, Fortitude Valley, QLD. 4006.

This excellent book, published in 1981 is obviously aimed at the medical market and will find a valued place in the casualty libraries in Australia. It is particularly concerned with envenomation in the northern half of Australia.

The book is divided into four sections. The first brief section gives an overview of envenomation and a list of state poison centres. An analysis of poison inquiries to the Queensland Poisons Information Centre over 3 years, shows 6.5% were about animal venoms, and the analysis of poisonings by animals show 17% were due to snakes.

The second section is on marine toxicology, of great interest to doctors in coastal regions of northern Australia. The section includes chapters on ciguatera poisoning, puffer fish, the Blue-ringed Octopus, the Box Jelly-fish, and other venomous fishes, by such distinguished authors as Robert Endean and John Harris.

The third section of the book is on arachnids, principally spiders, scorpions and ticks. The last section is on snakebite, and comprises 52 of the books in 134 pages. The first chapter is on Medically significant terrestrial snakes of northern Australia, by Jeanette Covacevich, Curator of Reptiles at the Queensland Museum. She gives a brief description of each species, a map of its distribution, and notes on envenomation. A number of species are illustrated in colour photographs, the rest in black and white. Though reproduction is less than perfect, the photographs are generally of good quality. The next chapter is entitled "Snakebite in Childhood", by Dr. John Pearn and Dr. Clarke Munro, both of the University of Queensland. This chapter is basically a reworking of a valuable paper by Pearn and Munro in the Australian Paediatric Journal (1978, 14: 248), but with the addition of some useful clinical photos of snakebite, and gives an interesting perspective on the medical problems of snakebite in children. The last chapter, on the treatment of snakebite, is an excellent review of the subject by Dr. Struan Sutherland, of C.S.L. My only criticism of this section is the scant detail on snake venoms, which I believe deserve more compehensive coverage.

The book is completed by two appendices and an index. Overall, this is an excellent book for doctors, and is also of interest to herpetologists interested in dangerous Australian snakes.

Dr. Julian White, Consultant on Envenomation, Adelaide Children's Hospital North Adelaide. SA. 5006.

"VENOMOUS CREATURES OF AUSTRALIA"
by Struan Sutherland. 128 pps. Oxford University Press, Melbourne. $9.95.

Dr. Sutherland is now well known Australia wide for his work at the Commonwealth Serum Laboratories on Australian venoms and the treatment of envenomation. This book is clearly aimed at the general public, rather than herpetologists and doctors, although both these groups will find this book interesting.

It commences with a concise explanation of first aid for envenomation in Australia, including the reasons such first-aid is effective. This is followed by descriptions of 60 venomous Australian animals, headed by the dangerous snakes, which are illustrated with beautiful colour photographs, mostly by Graeme Gow. The comments on envenomation attest to the author's considerable experience in this field.

The section on snakes is followed by sections on ants, bees, spiders, ticks, centipedes, scorpions, the platypus, and marine organisms.

Again this information content is high, and most of the illustrations are very good. Some of the information on anthropod envenomation is not readily available

elsewhere.

In summary this small book should find a place in the library of every Australian home, and in the casualty sections of hospitals, where it will be a valuable adjunct to other works on envenomation.

Julian White.
Consultant on Envenomation, Adelaide Children's Hospital, North Adelaide. SA. 5006.

PETER RANKIN TRUST FUND FOR HERPETOLOGY CALL FOR APPLICATIONS

Applications are now being called for the second round of grants-in-aid to be awarded by the Peter Rankin Trust Fund for Herpetology. Individual grants will be in the range $50.00 — $500.00. *The closing date for applications is 15th June 1982* and awards will be announced by 30th June 1982.

Applicants must be under 30 years of age, be permanent residents in/of Australia and must not already hold a position as a professional biologist. Applications are sought from all Australian States.

They should include the following information:—

1. Applicant's name, age and permanent address.
2. A brief outline of the project.
3. A brief budget specifying
   a). Travel and field costs; b). equipment and c) miscellaneous (with brief explanation.
4. Proposed date of completion.
5. The names of two people to whom the Selection Committee may refer if necessary.

Applications to:

The Peter Rankin Trust Fund for Herpetology,
The Australian Museum,
P.O. Box A 285,
SYDNEY SOUTH. N.S.W. 2000.

In accepting an award successful applicants will thereby agree to the following:

1. To comply with all State and Commonwealth fauna regulations.
2. To submit a brief report within one month of the completion date.
3. To acknowledge the Peter Rankin Trust Fund for Herpetology in any publication.

The Peter Rankin Trust Fund for Herpetology is an Australia-wide fund which seeks to provide small grants-in-aid to young Australian Herpetologists. The Fund makes awards annually to a total of approximately $1000.00. Contributions to the invested capital of the Fund are continually being sought by the Committee overseeing the Fund. The members of this Committee are Dr. Harold G. Cogger, Dr. Allen E. Greer and Mr. Aubrey N. Rankin.

REGIONAL NEWS

THE AFFILIATION:

The fourth Convention in New Zealand last October was an unqualified success. Forty delegates and guests (four from Australia) attended the very informative seminar sessions. The field trip to Tuatara island was an exciting and rewarding highlight to finish the convention. The delegates and Affiliation are most grateful to all who contributed to the success of this convention (see also NZHS report).

Due to increased costs it was necessary to raise the price of *Herpetofauna* and the

Convention fixed it at $Aust. 1-50 with provision to adjust the price if necessary before the next Convention.

The next (fifth) Convention is planned for Sydney in January 1984. Further details will appear in future Society newsletters and *Herpetofauna.*

A.H.S.

In October last year we surveyed the reptiles and frogs of an area near Wedderburn — twenty species of reptiles and frogs were recorded.

The popular Society "T" shirts are once more on sale and members wanting them should buy soon before they run out again.

A long trip to Western New South Wales is planned for Easter. Interested members should see their newsletter for details.

N.Z.H.S.

We are still getting over the Convention which was very well received by members. The Committee thanks all members and friends who helped in the preparation and running of the Seminars formal discussions and the field trips. Our particular thanks go to Prof. Joan Robb, Mr. Ian Newman, Mr. Ivan Borick and Mrs. Margaret Firth for their support and assistance which ensured the Convention's success.

Members have been involved in lizard rescue work at Massey near Auckland where a significant gecko area is being cleared for housing.

Five members travelled to Great Barrier Island over the Christmas break to continue the long term lizard study there.

S.A.H.G.:

The Group is getting down to the detailed planning of a reptile survey of the Euro Bluff area (approximately 400 km north of Adelaide). A grant of $3,400 was sought and the work is expected to start in September this year.

Local one day field trips continue to be popular also. The Juniors have now marked 150 Tawny Dragons in their survey and about 30 have so far been resighted.

The Committee is examining the possibility of holding a re-union meeting to mark the eleventh anniversary of the Group in 1982.

V.H.S.:

Following the mid-term resignations of Brain and Lani Barnett from the positions of President and Secretary, Peter Booth was elected President and Trevor Christian Secretary for the remainder of the term (June 1982). Brain Barnett offerred his assistance, in an unofficial capacity, to all members of the executive committee.

Several field trips have been undertaken during the past few months but are well down on the previous year.

The Society, once again, had its exhibit at the 1981 Royal melbourne Show. Although we do not obtain many new members from this display the more sensible questions being asked by the general public indicates a more thoughtful attitide towards reptiles in general.

W.H.G.:

The Whyalla Fauna park continues to be the focal point of the Group with an ongoing commitment to its reptile displays.

Peter Mirtschin and Richard Davis just had their book "Dangerous Snakes of Australia" published. The fine head drawings were done by President Greg Johnston and all are to be congratulated on their achievement.

Any herpetologists passing through the Eyre Peninsula area are invited to call in. We are keen to get any species locality information for our distribution mapping programme.

NOTES TO CONTRIBUTORS

"Herpetofauna" publishes original articles on any aspect of reptiles and amphibians. Articles are invited from any interested author; encouragement is given to articles reporting field work and observations.

1. PUBLICATION POLICY
Authors are responsible for the accuracy of the data presented in any submitted article. Current and formally recognised taxonomic combinations should be used unless the article is itself of a taxonomic nature proposing new combinations or describing new species. Upon publication, copyright in the article (including illustrations) become the property of the Affiliation. The original illustrations will be returned to the author, if requested, after publication.

2. SUBMISSION OF MANUSCRIPT
One copy of the article (including any illustrations) should be submitted, the author retaining a second copy. All material should be typewritten or clearly hand-written and double spaced. Grammar and punctuation should be checked and all pages must be numbered consecutively. The metric system should be also used throughout. All scientific names and subheadings should be underlined. The author's name and address should appear under the title. Latitude and longitude of the localities mentioned should be indicated.

3. ILLUSTRATIONS
Illustrations (drawings, maps or photographs) should be twice the anticipated published size if possible. Drawings should be in Indian Ink on high quality, matt white paper. Author's should retain a copy of each illustration.

4. REFERENCES
Any references made to other published material must be cited in the text, giving the author, the year of publication and the page numbers if necessary, e.g. Jones: (1968, p.24). At the end of the article full reference should be given. (See this journal).

5. PROOFS
If any changes, other than minor ones, need to be made to the article, a proof with suggested changes will be sent to the author for his revision. Proofs should then be re-submitted by the author as soon as possible.

6. REPRINTS
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